Claims

1. A gas barrier film comprising a thermoplastic polymer film, and an inorganic thin film provided on at least one surface of the thermoplastic polymer film, which gas barrier film is formed by applying, to the inorganic thin film, a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less and which has a total ion concentration of 1×10^{-5} mol/L or more and less than 10 mol/L and a solution concentration less than a saturation concentration.

2. A gas barrier film as described in claim 1, wherein the total ion concentration of at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less is 1×10^{-4} mol/L or more and less than 1×10^{-1} mol/L, and the solution concentration is less than a saturation concentration.

3. A gas barrier film comprising a thermoplastic polymer film, and an inorganic thin film provided on at least one surface of the thermoplastic polymer film, which gas

barrier film is formed by applying, to the inorganic thin film, a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less such that the total weight of the ion species in a film area of 1.00 m^2 is adjusted to 1.0 μg to 30 g.

4. A gas barrier film as described in claim 1, wherein the inorganic thin film contains silicon oxide.

5. A gas barrier film comprising a thermoplastic polymer film, and an inorganic thin film provided on at least one surface of the thermoplastic polymer film, wherein the thin film has a total alkali metal ion and alkaline earth metal ion concentration in a film area of 1.00 m^2, as determined through inductively coupled plasma Auger electron spectroscopy (ICP-AES), of 2.0 μg to 1,000 μg

6. A gas barrier film as described in claim 4, wherein the thin film containing silicon oxide has a ratio of total ion intensity A to ion intensity B (A/B), as determined by means of a time-of-flight secondary ion mass spectrometer (TOF-SIMS), is $0.20 \leq A/B \leq 100$, wherein ion intensity A represents the sum of peak intensities attributed to total alkali metal ions, alkaline earth metal ions, and ammonium

ions contained in the thin film, and ion intensity B represents a peak intensity attributed to ^{30}Si.

7. A gas barrier film as described in claim 4, wherein the thin film containing silicon oxide has a ratio of ion intensity C to ion intensity B (C/B), as determined by means of a TOF-SIMS, of $0.04 \leq C/B \leq 0.50$, wherein ion intensity B represents a peak intensity attributed to ^{30}Si, and ion intensity C represents a peak intensity attributed to $^{30}SiOH$

8. A gas barrier film as described claim 1, which is formed by applying, to the inorganic thin film, a mixture solution containing a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less and a solution which contains at least one species selected from a resin and a metal oxide sol.

9. A gas barrier film as described claim 1, which is formed by applying, to the inorganic thin film, a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less, to thereby form a layer, and by forming thereon a resin

solution coating layer.

10. A gas barrier film as described claim 1, which is formed by applying, to the inorganic thin film, a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less, and, subsequently, carrying out heat treatment at 60°C or higher.

11. A method for producing a gas barrier film, which method comprises the steps of:

forming an inorganic thin film on at least one surface of a thermoplastic polymer film and,

subsequently, applying, to the inorganic thin film, a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less and which has a total ion concentration of 1×10^{-5} mol/L or more and less than 10 mol/L and a solution concentration less than a saturation concentration.

12. A method for producing a gas barrier film, which method comprises the steps of:

forming an inorganic thin film on at least one surface

of a thermoplastic polymer film and,

applying, to the inorganic thin film, a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less such that the total weight of the ion species in a film area of 1.00 m^2 is adjusted to 1.0 μg to 30 g.

13. A gas barrier film as described in claim 3, wherein the inorganic thin film contains silicon oxide.

14. A gas barrier film as described in claim 13, wherein the thin film containing silicon oxide has a ratio of total ion intensity A to ion intensity B (A/B), as determined by means of a time-of-flight secondary ion mass spectrometer (TOF-SIMS), is $0.20 \leq A/B \leq 100$, wherein ion intensity A represents the sum of peak intensities attributed to total alkali metal ions, alkaline earth metal ions, and ammonium ions contained in the thin film, and ion intensity B represents a peak intensity attributed to ^{30}Si.

15. A gas barrier film as described in claim 13, wherein the thin film containing silicon oxide has a ratio of ion intensity C to ion intensity B (C/B), as determined by means of a TOF-SIMS, of $0.04 \leq C/B \leq 0.50$, wherein ion intensity B represents a peak intensity attributed to ^{30}Si,

and ion intensity C represents a peak intensity attributed to $^{30}SiOH$.

16. A gas barrier film as described claim 5, which is formed by applying, to the inorganic thin film, a mixture solution containing a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less and a solution which contains at least one species selected from a resin and a metal oxide sol.

17. A gas barrier film as described claim 5, which is formed by applying, to the inorganic thin film, a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-weight electrolyte having a molecular weight of 1,000 or less, to thereby form a layer, and by forming thereon a resin solution coating layer.

18. A gas barrier film as described claim 5, which is formed by applying, to the inorganic thin film, a solution which contains at least one ion species selected from the group consisting of alkali metal ions, alkaline earth metal ions, and ammonium ions and originating from a low-molecular-

weight electrolyte having a molecular weight of 1,000 or less, and, subsequently, carrying out heat treatment at 60°C or higher.